Operation RubyThroat: The Hummingbird Project Protocol

Purpose

To observe seasonal migration patterns, feeding habits, and nesting behavior of Ruby-throated Hummingbirds (*Archilochus colubris*) in North & Central America.

Outcomes

Students will learn how to identify and age male & female Ruby-throated Hummingbirds (RTHUs) and to observe migration and feeding behavior. Students will make connections among weather, climate, food availability, seasonality, photoperiod (day length), and hummingbird behavior.

Key Concepts

Life Sciences

Refer to Table 1

Geography

Refer to Table 2

Science Inquiry Abilities

Specific Abilities

- Identify, age, and sex Ruby-throated Hummingbirds (RTHUs)
- Count living, moving hummingbirds
- Identify flower species
- Plant and care for Hummingbird Habitats *(optional)*

Inquiry Abilities

- Identify answerable questions
- Design & conduct scientific investigations
- Use appropriate math to analyze data
- Develop descriptions & explanations using evidence
- Recognize & analyze alternate explanations
- Communicate procedures & explanations

Overview

Students collect data for one or more of the following Special Measurements:

- Observe first Spring sighting of RTHUs
- Make daily observations
- Record RTHU sightings throughout hummingbird season (Spring through Autumn)
- Observe final departure date of RTHUs in Autumn
- Count number of RTHU visits to bird feeders or to flowers, or compare bird feeder versus flower visits
- Count number of RTHU visits to different flower species in a garden, flower box, or natural area
- Observe nesting behavior
- Report "unusual" hummingbirds that are color-marked, have abnormal plumage, or that occur out of normal range

Time

- Sightings: Any time during day
- Bird feeder and Flower Visits: 45 minutes at same time of day
- Flower Species Visits: 45 minutes minimum at same time of day (if possible make observations for several consecutive hours)

Frequency

- First Spring Sighting: Daily for three weeks (beginning mid-March in South, later in North)
- Sightings Through Seasons: Daily preferred
- Bird feeder & Flower Visits: At least two times each week (daily, if possible, from 1 April to 1 October)
- Last Autumn Sighting: Daily (preferred) for three weeks (late September until mid-October)
- "Unusual" hummingbirds: When sighted

Level

All

(continued next page)

Materials & Tools

- *GLOBE Hummingbird Data Sheets*
- *GLOBE GPS Data Sheet*
- *GLOBE GPS Field Guide*
- Calculator *(optional)*
- Camera
- Hummingbird feeder & food (optional if hummingbird flowers are used)
- Hummingbird flowers (optional if hummingbird feeder is used)
- Clipboard
- Pencils and pens
- Binoculars *(optional)*
- Bird identification guide
- Wildflower identification guide *(optional)*
- Cultivated flower identification guide *(optional)*
- GPS receiver *(may be borrowed)*
- Compass

Preparation

Learn how to identify male, female, and immature Ruby-throated Hummingbirds, using bird identification guides and information on the Web site for "*Operation RubyThroat: The Hummingbird Project*" at www.rubythroat.org.

Prerequisites

None

Table 1 (below): Connections to the National Science Education Standards

LIFE SCIENCES		
K-4	**5-8**	**9-12**
Characteristics of Organisms • Organisms can only survive in environments where their needs are met **Life Cycles of Organisms** • Plants and animals have life cycles • Some animals, through migration, spend parts of their life cycles in different ecosystems • Reproduction is a characteristic of all living organisms	**Structure & Function of Living Systems** • Functions of an organism relate to and change the nature of its environment • Interaction among organisms in an ecosystem results in adaptive change in organisms over time **Regulation & Behavior** • All organisms must be able to obtain and use resources while living in a constantly changing environment **Populations & Ecosystems** • All populations living together and the physical factors with which they interact constitute an "ecosystem"	**Interdependence of Organisms** • Organisms both cooperate and compete in ecosystems • Organisms living together and the physical factors with which they interact constitute an ecosystem 

Table 2 (below): Connections to the National Geography Education Standards

GEOGRAPHY		
K-4	**5-8**	**9-12**
The World in Spatial Terms **How to use maps (real and mental.** *Summary: Maps can be used to understand local and regional environments in spatial terms* **Physical Systems** The physical processes that shape the patterns of Earth's surface *Summary: The physical processes that shape the patterns of Earth's surface shape the physical environment* The characteristics and spatial distribution of ecosystems on Earth's surface *Summary: The physical characteristics and spatial distribution of ecosystems on Earth's surface affect the nature of biodiversity, the interactions among other organisms and humans, and their changes over time* **Environment & Society** How human activities modify the physical environment *Summary: Human activities modify the physical environment* The changes that occur in the meaning, use, distribution, and importance of resources • Characteristics of renewable and non renewable resources *Summary: Geography may be used to interpret the past and predict future changes* in the environment	**The World in Spatial Terms** **How to use maps (real and mental.** Summary: Maps can be used to understand local and regional environments in spatial terms **Physical Systems** The physical processes that shape the patterns of Earth's surface *Summary: The physical processes that shape the patterns of Earth's surface shape the physical environment* The characteristics and spatial distribution of ecosystems on Earth's surface *Summary: The physical characteristics and spatial distribution of ecosystems on Earth's surface affect the nature of biodiversity, the interactions among other organisms and humans, and their changes over time* 	**The World in Spatial Terms** **How to use maps (real and mental.** Summary: Maps can be used to understand local and regional environments in spatial terms **Physical Systems** The physical processes that shape the patterns of Earth's surface *Summary: The physical processes that shape the patterns of Earth's surface shape the physical environment* The characteristics and spatial distribution of ecosystems on Earth's surface • The distribution and characteristics of ecosystems • The biodiversity and productivity of ecosystems • The importance of ecosystems in people's understanding of environmental issues *Summary: The physical characteristics and spatial distribution of ecosystems on Earth's surface affect the nature of biodiversity, the interactions among other organisms and humans, and their changes over time*

Teacher Support

Site Selection

Bird sightings can be made anywhere in your community, but it is best to select one location and repeat observations at that site. Multiple locations can be established. A bird feeder can be in the schoolyard, hung outside the classroom window, in a park or other public area, or in someone's yard. It should be easily accessible for frequent visits and easy observation. Flowers can be anywhere in your community: in a planted and maintained garden, in a flower box or hanging basket, or in a natural area. Define a site for bird feeder and flower areas using the *Hummingbird Site Definition Field Guide* and *Hummingbird Site Definition Data Sheet.*

Helpful Hints

• Special Measurements of the Ruby-throated Hummingbird (RTHU) can be used as a focus for integrated studies of atmosphere, phenology, land cover, botany, animal behavior, geography, and other disciplines.

• Visit the Web site for "Operation RubyThroat: The Hummingbird Project" on the Web at www.rubythroat.org for more information. Each page has access to an on-line search engine that allows you to type in a key word or phrase. There is also an extensive glossary of hummingbird terms that will be useful as students observe RTHUs and broaden their knowledge of birds and habitats.

• Special Measurements of feeder and flower frequency require observations for 45 minutes. Students working in a group can take turns making observations so that no student gets tired or bored.

• If you plan to incorporate hummingbird protocols into your fall curriculum, try to hang and maintain a hummingbird feeder near your classroom a few weeks before school starts. Late Summer and Autumn are the busiest time for RTHUs in the U.S. and southern Canada, and having a feeder out before the school year starts will allow your students to conduct up to a month of observations before the RTHUs migrate further south for the Winter.

• Spend some time in different seasons exploring neighborhoods around the school. Look for natural and cultivated plots containing hummingbird flowers such as Trumpet Creeper, *Campsis radicans* (see below), a common but important food source throughout much of the RTHU's breeding range.

• Students may plant and care for a Schoolyard Hummingbird Habitat, or for a garden plot elsewhere in the neighborhood. Master Gardeners or local garden clubs may be interested in assisting with such a project. If you plant a habitat, be sure it can be cared for during summer months. Hints for landscaping for hummingbirds are at www.rubythroat.org/LandscapingMain.html.

• Remember, a Schoolyard Hummingbird Habitat need not be a huge garden. A flower box or hanging basket is a good start at providing the shelter, space, and food that RTHUs need to survive and reproduce.

• If hummingbird feeders are used, fill them with a solution of 4 parts water, 1 part sugar; if hummingbirds do not drain a feeder, replace the solution TWICE each week (every third or fourth day) to eliminate mold. See www.rubythroat.org/ FeedingHintsMain.html for additional information.

• Students can observe hummingbirds throughout their communities. Each location should have a unique site definition.

• Much hummingbird activity in the U.S. occurs during Summer months when schools are not in session. Nevertheless, data collected in Spring or Autumn (including early arrival and final departure dates) are valuable. Students also may be encouraged to continue to collect data during Summer months—even if they are away from home—by using a Summer address as the reporting station. Don't forget that each new location needs a new site definition.

• Hummingbird observations are also an excellent activity for summer enrichment programs at schools, camps, and nature centers, or for home-schooled students.

• Most likely there are bird experts in your community. One or more may be willing to work with your students on hummingbird projects, particularly if daily observations are made throughout the Summer. Contact a local bird expert and find out the average dates that RTHUs arrive in Spring and leave in Autumn (usually late March through early October). Observations should start before the average Spring arrival.

• If possible, take photos of vagrant hummingbirds and any color-marked or unusual RTHUs. Have students contact Hilton Pond Center for Piedmont Natural History at research@hiltonpond.org or (803) 684-5852 as soon as possible after observations are made so unusual sightings can be verified and the birds possibly banded. Observations also should be recorded on student data sheets and reported through the GLOBE Web site.

• Personnel from Hilton Pond Center for Piedmont Natural History may be able to visit your school during the academic year to provide further instruction and possibly to band hummingbirds at your site. Host schools will be selected from those that submit data to "Operation RubyThroat: The Hummingbird Project" and The GLOBE Program.

• Encourage fellow teachers in all subject areas to participate with you and your students in Operation RubyThroat. Many aspects of the project are cross-disciplinary and can involve language arts, music, drama, art, geography, social studies, mathematics, Spanish—virtually any curriculum topic. For hints on cross-disciplinary activities, see www.rubythroat.org/ ActivitiesXDisciplineMain.html. The most successful implementations of Operation RubyThroat have been school-wide projects in which every student and teacher was involved in some way.

• "Operation RubyThroat: The Hummingbird Project" is open to students in the U.S., Canada, Mexico, and all seven countries of Central America. Please encourage fellow teachers at schools in these states and countries to participate.

Sample Questions for Further Investigation

Through "Operation RubyThroat: The Hummingbird Project," you will learn many things about behavior and ecology of Ruby-throated Hummingbirds (RTHUs). And, by collecting additional GLOBE data about atmosphere, climate, hydrology, soils, and phenology, you also may be able to discover new relationships between RTHUs and factors that affect them. As you conduct your studies of RTHUs and other GLOBE protocols, you undoubtedly will come up with many questions about these tiny birds and their environment. Below are a few "sample questions" to help you start thinking analytically about your work.

- How do you think storms affect the number of RTHUs you see in your area during Spring? Summer? Autumn?
- Does temperature in Spring seem to affect when RTHU nests are built and eggs laid?
- Does northward migration of RTHUs in Spring appear to be more closely related to maximum, minimum, or current daily temperatures?
- Does the number of RTHUs in your study area change from Spring through Autumn? Does the mix of ages and sexes change over that time?
- What environmental and ecological factors that are different in Winter make it difficult for RTHUs to stay in areas where they breed?
- What can you do to improve chances that RTHUs will be attracted to your school or neighborhood?
- What other questions come to mind when you observe RTHU behavior at feeders or in your Schoolyard Hummingbird Habitat?

Selected References

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Sargent, R. 1999. Ruby-throated Hummingbird. Stackpole Books, Mechanicsburg PA.
Stokes, D. & L. Stokes. 2002. Beginner's Guide to Hummingbirds. Little, Brown, and Co., NY.
Williamson, S.L. 200l. A Field Guide to Hummingbirds of North America. Houghton Mifflin, NY.

Frequently Asked Questions About Ruby-throated Hummingbirds (RTHUs) & Operation RubyThroat

1. Why are we counting the number of times hummingbirds visit feeders? Although a RTHU may vigorously defend a feeder and try to drive away other hummingbirds, several individual hummingbirds visit most feeders. Thus, frequency of feeder visits may be an indication of the number of RTHUs in a given area.

2. Should I record data if other types of hummingbirds visit a feeder or flower garden? East of the Great Plains, RTHUs are the only breeding hummingbird species and the only ones likely to be observed from 1 April through 1 October. However, hummingbird species that breed in the western U.S. are known to wander eastward. If you observe a hummingbird that you think is not a RTHU, please report it immediately to research@hiltonpond.org or (803)684-5852. (You may include its visits on your tally sheet but you should indicate it is not a RTHU.) It is also possible you might see a color-marked RTHU that has been captured, banded, and color-marked with green dye on its throat (for details see www.rubythroat.org/NewsRFIColormark00Sp.html).

3. I live in the western U.S. where RTHUs don't occur. Can I still participate in Operation RubyThroat? We may be able to make provisions for you to submit data, even though you will be observing different hummingbird species. You'll need to contact projects@rubythroat.org to work out specific protocols.

4. I started my hummingbird observations in Spring at school. Can I continue them during Summer? You are encouraged to continue observations after school is out and again in Autumn, even if a teacher does not directly supervise you. In this case, use your home address as a reporting station. Home-schooled students, nature centers, and Summer camps are also welcome to participate in the project.

5. What if I go on vacation or miss a day during the Summer and am not able to make sighting observations? Although you should try to make observations on a regular basis, we realize that circumstances sometimes interfere. The important thing is to keep accurate records and to make note of when you miss observations for whatever reason.

6. Does it matter where I sight RTHUs? Does it have to be at a set location and time like the feeder visits? To help eliminate variables and provide a larger database, it is better to select one location and repeat observations at that site on a regular schedule as many times as possible. However, multiple locations and times also may yield useful comparative data. Each location should have a unique site definition.

7. How do I know when to start looking for RTHUs in Spring? RTHUs rarely winter in southern Florida and in states along the Gulf of Mexico. Most RTHUs apparently depart from Mexico and Central America by mid-March. The earliest birds get to the Gulf Coast states about 1 March and move northward over the next several weeks. There is some indication there may be

two waves of RTHU migration into the U.S., one in late March and another up to a month later.

8. Why is it important to keep track of how often I see RTHUs from Spring through Autumn? One way to estimate the size of local RTHU populations is to keep track of how many you see and when you see them. In addition, the only reliable way to know when the last RTHU leaves your area in Autumn is to make observations every day from September through late October.

9. What if RTHUs show up in Spring and then disappear? There may be an early wave of RTHU migrants that stop for a few days at your feeder or garden and then continue flying north. It's also common in Spring even for local hummingbirds to seemingly disappear—especially females who spend most of the day sitting on eggs or nestlings. Numbers of RTHUs should increase dramatically in mid-Summer as young birds leave their nests and as early migrants from further north begin to fly back south. Gaining better understanding of this phenomenon is one reason for making daily sightings all during the time RTHUs are in North America.

10. Can you tell if a hummingbird is young or an adult? In Spring (up to mid-May) all free-flying RTHUs are adults and red-throated males are easily distinguished from white-throated females. As soon as young RTHUs start leaving the nest, ageing and sexing are more difficult because both young females and young males lack red throats. Thus, a white-throated RTHU cannot be aged or sexed reliably in the field after mid-May unless it is a young male that has developed a few red feathers or heavy green or black streaking on its throat (see photos at www.rubythroat.org/RTHUExternalMain.html).

11. If I have to choose, which is better to observe: frequency of visits to feeders or flowers? There is probably more to be learned about hummingbirds by observing them feeding on natural food sources, especially native flower species. Ideally, however, your Hummingbird Habitat also will have a feeder in it, allowing for both kinds of observations.

12. What types of flowers should be in the flower garden? Hummingbird flowers come in all colors and shapes, but many of them are red and tubular. The Web site for "Operation RubyThroat: The Hummingbird Project" has illustrated lists of ten native and ten exotic hummingbird flowers and hints for cultivating them (see www.rubythroat.org/FoodMain.html).

13. Does a Hummingbird Habitat have to be a certain size? Even window boxes or hanging baskets with hummingbird flowers would do if a full garden were not available. If a garden is used, choose an area that is not too big to be observed without changing your viewing spot.

14. Why would RTHUs choose different flower species throughout the day? This is not fully understood, but we do know that some flower species are known to produce nectar at different rates at various times of the day, perhaps influencing which flower species RTHUs choose.

15. Will I ever get a chance to band a hummingbird? Students at schools near Hilton Pond Center for Piedmont Natural History in York SC may be able to schedule a bird banding field trip to the Center. In addition, Center personnel will visit a limited number of schools in the states and countries where RTHUs occur; on-site hummingbird banding may be a possibility during these visits. Schools must submit data to "Operation RubyThroat: The Hummingbird Project" and The GLOBE Program and apply to the Center to be considered for field trips or in-school visits.

If you have other questions, you may want to visit the Web site for "Operation RubyThroat: The Hummingbird Project" at www.rubythroat.org and type a keyword or phrase into its on-line search engine. The Web site contains extensive information and many photographs. If you still can't find the answer, contact the GLOBE Help Desk or send an e-mail message to projects@rubythroat.org.

Ruby-throated Hummingbird (RTHU)
Site Definition Field Guide

Task

- To describe and locate the latitude, longitude, and elevation of a hummingbird site.

What You Need

- ❑ *GPS Protocol Field Guide*
- ❑ *GPS Data Sheet*
- ❑ GPS receiver *(may be borrowed)*
- ❑ Calculator *(optional)*
- ❑ Compass
- ❑ Pencil or pen
- ❑ Notebook or clipboard & paper
- ❑ Camera
- ❑ *Hummingbird Site Definition Data Sheet*
- ❑ Wildflower identification guide *(optional if only hummingbird feeder is used)*
- ❑ Cultivated flower identification guide *(optional if only hummingbird feeder is used)*

In the Field

1. Complete the top of the *Hummingbird Site Definition Data Sheet* (Recorded By, Measurement Time, Site Name). Identify the latitude, longitude, and elevation following the *GPS Protocol Field Guide*.
2. Record the average latitude, longitude, and elevation from the *GPS Data Sheet* on the *Hummingbird Site Definition Data Sheet.*
3. Indicate if a hummingbird feeder, hummingbird nest, and/or flowers are present at site.
4. When possible, identify and list any species of flowering plants that are present. (NOTE: Plant species that are actually producing blooms at any given time may change from Spring through Autumn.)
5. Take a photo in each cardinal direction: North, South, East and West. Use your compass to determine the directions.

In the Classroom/Lab

Carefully submit your data electronically to GLOBE's Web site.

Ruby-throated Hummingbird (RTHU)
Sighting Protocol Field Guide

Task

To observe and record one or more of the following:

- Early arrival date of RTHUs in Spring
- Final date RTHUs are observed in Autumn
- RTHU sightings between early arrival and final sighting
- Color-marked or unusual RTHUs, or other species of hummingbirds (vagrants)

What You Need

❑ Pencil or pen ❑ Binoculars (optional) ❑ Bird identification guide
❑ *Ruby-throated Hummingbird Sighting Data Sheet*

In the Field

1. Every day about two weeks before the expected arrival of RTHUs, begin looking for RTHUs in your neighborhood and schoolyard. In most U.S. locations, the first RTHUs arrive in March and depart by early October. *Record observation times even if hummingbirds are not seen*.
2. If possible, determine sex (and age) of each RTHU that is observed.
3. Record date of first RTHU Spring sighting—including sex and age (if known)—on the *Ruby-throated Hummingbird Sighting Data Sheet.* (NOTE: In Spring through mid-May, RTHUs are easily aged and sexed; only adult males have a full red throat and only adult females have white throats.)
4. In Spring, Summer, and Autumn, look for RTHUs every day. Record:
   - Each date a red-throated adult male is observed (March through October)
   - Each date an adult female is observed (white throat, March and April only)
   - Each date an undetermined sex is observed (if throat is not observed)
   - Each date an undetermined sex (adult female/young female/young male) is observed (May through October, if throat is unmarked)
   - Each date a young male is observed (May through October, if throat is heavily streaked in green or black and/or has one or more red feathers)
5. After no more RTHUs are seen, record final date of:
   - Adult male (March through November)
   - Undetermined sex (if throat is not observed)
   - Undetermined sex (adult female/young female/young male, if throat is unmarked)
   - Young male (if throat is heavily streaked in green or black and/or has one or more red feathers)
6. *In the protocols above, Observation Start Time and Observation End Time may be the same for an individual sighting.*

In the Classroom/Lab

Carefully submit your data electronically to GLOBE's Web site, compare your hummingbird data with that of other schools, and look for relationships between hummingbird data and other GLOBE protocols (atmosphere, climate, land cover, hydrology, phenology, etc.).

NOTE: *If you see a color-marked or unusual RTHU, other species of hummingbirds (vagrants), or ANY hummingbird from mid-October through mid-March, describe the color markings and shape of beak. Record your observations on the Ruby-throated Hummingbird Sighting Data Sheet. Contact Hilton Pond Center for Piedmont Natural History at research@hiltonpond.org or (803) 684-5852 as soon as possible.*

Ruby-throated Hummingbird (RTHU)
Feeder Visit Protocol Field Guide

Task

- To count the number of times RTHUs visit a feeder in 45 minutes.

What You Need

- ❑ Hummingbird feeder
- ❑ Food for feeder
- ❑ Pencil or pen
- ❑ Clipboard
- ❑ Binoculars (optional)
- ❑ Bird identification guide
- ❑ *Ruby-throated Hummingbird Feeder Visit Data Sheet*

In the Field

1. Fill out the top of the *Ruby-throated Hummingbird Feeder Visit Data Sheet*. Record date and time period that observations are made.
2. For each RTHU seen, identify its sex and age if possible.
3. Record each visit to the feeder on the *Ruby-throated Hummingbird Feeder Visit Data Sheet* during the 45 minutes. Record by the following categories:
   - Red-throated adult male (March through October)
   - Adult female (white-throated, March and April only)
   - Undetermined sex (if throat is not observed)
   - Undetermined sex (adult female/young female/young male, May through October, if throat is unmarked)
   - Young male (if throat is heavily streaked in green or black and/or has one or more red feathers

In the Classroom/Lab

Carefully submit your data electronically to GLOBE's Web site, compare your hummingbird data with that of other schools, and look for relationships between hummingbird data and other GLOBE protocols (atmosphere, climate, land cover, hydrology, phenology, etc.).

NOTE 1: *If an individual bird comes to the feeder, departs, and immediately returns to the feeder without perching in the field of view, it counts as only one visit. If it perches within view and returns to the feeder, it still counts as one visit. Only if the bird leaves the field of view and returns can it be counted again, and then it should be counted again even if you think it may be the same bird.*

NOTE 2: *If you see a color-marked or unusual RTHU, other species of hummingbirds (vagrants), or ANY hummingbird from mid-October through mid-March, describe the color markings and shape of beak. Record your observations on the Ruby-throated Hummingbird Sighting Data Sheet. Contact Hilton Pond Center for Piedmont Natural History at research@hiltonpond.org or (803) 684-5852 as soon as possible.*

Ruby-throated Hummingbird (RTHU)
Flower Visit Protocol Field Guide

Task
• To count the number of times RTHUs visit flowers in 45 minutes.

What You Need
❑ Pencil or pen
❑ Clipboard
❑ Binoculars *(optional)*
❑ Bird identification guide
❑ Camera
❑ *Ruby-throated Hummingbird Flower Visit Data Sheet*

In the Field
1. Fill out the top of the *Ruby-throated Hummingbird Flower Visit Data Sheet.* Record date and time period that observations are made.
2. For each RTHU seen, identify its sex and age if possible.
3. Record each visit to flowers on the *Ruby-throated Hummingbird Flower Visit Data Sheet* during the 45 minutes. Record by the following categories:
   - Red-throated adult male (March through October)
   - Adult female (white-throated, March and April only)
   - Undetermined sex (if throat is not observed)
   - Undetermined sex (adult female/young female/young male, May through October, if throat is unmarked)
   - Young male (if throat is heavily streaked in green or black and/or has one or more red feathers

In the Classroom/Lab
Carefully submit your data electronically to GLOBE's Web site, compare your hummingbird data with that of other schools, and look for possible relationships between hummingbird data and other GLOBE protocols (atmosphere, climate, land cover, hydrology, phenology, etc.).

NOTE 1: *If an individual bird enters the garden and feeds on several flowers—even different flower species—it counts as only one visit. If a bird perches within view and returns to the flowers, it still counts as one visit. Only if the bird leaves the field of view and returns can it be counted again, and then it should be counted again even if you think it may be the same bird.*

NOTE 2: *If you see a color-marked or unusual RTHU, other species of hummingbirds (vagrants), or ANY hummingbird from mid-October through mid-March, describe the color markings and shape of beak. Record your observations on the Ruby-throated Hummingbird Sighting Data Sheet. Contact Hilton Pond Center for Piedmont Natural History at research@hiltonpond.org or (803) 684-5852 as soon as possible.*

Ruby-throated Hummingbird (RTHU)
Feeder Vs. Flower Visit Protocol Field Guide

Task

- To count and compare the number of times RTHUs visit flowers and feeders in 45 minutes.

What You Need

- ❑ Hummingbird feeder
- ❑ Fresh food mixture for hummingbird feeder
- ❑ Pencil or pen
- ❑ Clipboard
- ❑ Binoculars *(optional)*
- ❑ Bird identification guide
- ❑ Camera
- ❑ Schoolyard Hummingbird Habitat, flower garden, or wildflower patch
- ❑ *Ruby-throated Hummingbird Feeder Vs. Flower Visit Data Sheet*

In the Field

1. Fill out the top of the *Ruby-throated Hummingbird Feeder Vs. Flower Visit Data Sheet*. Record date and time period that observations are made.
2. For each RTHU seen, identify its sex and age if possible.
3. Record each visit to the feeder and flowers on the *Ruby-throated Hummingbird Feeder Vs. Flower Visit Data Sheet* during the 45 minutes. Record by the following categories:
   - Red-throated adult male (March through October)
   - Adult female (white-throated, March and April only)
   - Undetermined sex (if throat is not observed)
   - Undetermined sex (adult female/young female/young male, May through October, if throat is unmarked)
   - Young male (if throat is heavily streaked in green or black and/or has one or more red feathers

In the Classroom/Lab

Carefully submit your data electronically to GLOBE's Web site, compare your hummingbird data with that of other schools, and look for possible relationships between hummingbird data and other GLOBE protocols (atmosphere, climate, land cover, hydrology, phenology, etc.).

NOTE 1: *If an individual bird enters the garden and feeds on a flower, then at a feeder, then on a flower, it counts as two flower visits and one feeder visit. Every separate visit to a flower or feeder is counted. If a bird feeds on the same flower or flower stalk several times in succession, it counts as only one flower visit. If a bird feeds on Flower A, then on Flower B, and again on Flower A, it counts as three visits. This procedure is different from the observations made when you are looking only at feeder visits or only at flower visits.*

NOTE 2: *If you see a color-marked or unusual RTHU, other species of hummingbirds (vagrants), or ANY hummingbird from mid-October through mid-March, describe the color markings and shape of beak. Record your observations on the Ruby-throated Hummingbird Sighting Data Sheet. Contact Hilton Pond Center for Piedmont Natural History at research@hiltonpond.org or (803) 684-5852 as soon as possible.*

Ruby-throated Hummingbird (RTHU)
Flower Species Visit Protocol Field Guide

Task

- To count the number of times RTHUs visit different flower species during 45 minutes. (Observations may be continued during consecutive and/or subsequent hours to see if hummingbird flower selection changes throughout the day.)

What You Need

❑ Pencil or pen ❑ Clipboard ❑ Binoculars *(optional)*
❑ Bird identification guide ❑ Camera
❑ *Ruby-throated Hummingbird Flower Species Visit Data Sheet*
❑ Local wildflower & cultivated flower identification guides

In the Field

1. Fill out the top of the *Ruby-throated Hummingbird Flower Species Visit Data Sheet.* Record date and time period when observations are made.
2. Identify the different flower species at site. Record flower species on the *Ruby-throated Hummingbird Flower Species Visit Data Sheet.* If you are unable to identify the flower to species, at least take it to genus level.
3. Submit a close-up photograph of any flower species that is visited by a hummingbird on your study site. This will allow verification of the identification to species.
4. For each RTHU seen during the 45 minutes, identify its sex and age if possible.
5. For each flower species, record by the following categories:
   - Red-throated adult male (March through October)
   - Adult female (white-throated, March and April only)
   - Undetermined sex (if throat is not observed)
   - Undetermined sex (adult female/young female/young male, May through October, if throat is unmarked)
   - Young male (if throat is heavily streaked in green or black and/or has one or more red feathers

In the Classroom/Lab

Carefully submit your data electronically to GLOBE's Web site, compare your hummingbird data with that of other schools, and look for possible relationships between hummingbird data and other GLOBE protocols (atmosphere, climate, land cover, hydrology, phenology, etc.).

NOTE 1: *If an individual bird enters the garden and feeds on several flowers, it counts as only one visit; if it perches within view and returns to the flowers, it still counts as one visit; only if the bird leaves the field of view and returns can it be counted again, and then it should be counted again even if you think it may be the same bird.*

NOTE 2: *If you see a color-marked or unusual RTHU, other species of hummingbirds (vagrants), or ANY hummingbird from mid-October through mid-March, describe the color markings and shape of beak. Record your observations on the Ruby-throated Hummingbird Sighting Data Sheet. Contact Hilton Pond Center for Piedmont Natural History at research@hiltonpond.org or (803) 684-5852 as soon as possible.*

Ruby-throated Hummingbird (RTHU)
Nesting Report Protocol Field Guide

Task

- To observe and report nesting behavior of RTHUs.

What You Need

❑ Pencil or pen
❑ Clipboard
❑ Binoculars *(optional)*
❑ Bird identification guide
❑ Camera
❑ *Ruby-throated Hummingbird Nesting Data Sheet*

In the Field

1. Fill out the top of the *Ruby-throated Hummingbird Nesting Data Sheet.* Record when the nest was found.
2. Record the dates for what you can of the following observations. **Do not disturb the nest.**
   - Start of nest construction
   - End of nest construction
   - Laying of first egg
   - Laying of second egg
   - First sighting of adult female sitting on nest
   - Hatching date(s) for egg(s)
   - First sighting of young hummingbirds (nestlings) in nest
   - Fledging date (when nestlings leave the nest)
   - Last sighting of adult female on nest
3. Record if the eggs do not hatch or if the nestlings die. If the female rebuilds the nest or reuses the nest for a new set of eggs, fill out a second data sheet and record the new observations as listed above.
4. Record dates and observations of any adult male behavior at the nest. Be careful to report observations of what you actually see, rather than an interpretation of what you see.
   Examples: 2 April 2002—Male perched on nest for 30 seconds (NOT male incubating eggs)
   1 May 2002—Male flying over nest (NOT male protecting nest)

In the Classroom/Lab

Carefully submit your data electronically to GLOBE's Web site, compare your hummingbird data with that of other schools, and look for possible relationships between hummingbird data and other GLOBE protocols (atmosphere, climate, land cover, hydrology, phenology, etc.).

NOTE 1: *It is against state or federal law to possess the body, feathers, skeleton, nest or eggs of any wild free-flying bird—including hummingbirds—unless you have a special permit.*

NOTE 2: *If you see a color-marked or unusual RTHU, other species of hummingbirds (vagrants), or ANY hummingbird from mid-October through mid-March, describe the color markings and shape of beak. Record your observations on the Ruby-throated Hummingbird Sighting Data Sheet. Contact Hilton Pond Center for Piedmont Natural History at research@hiltonpond.org or (803) 684-5852 as soon as possible.*